Simulation update

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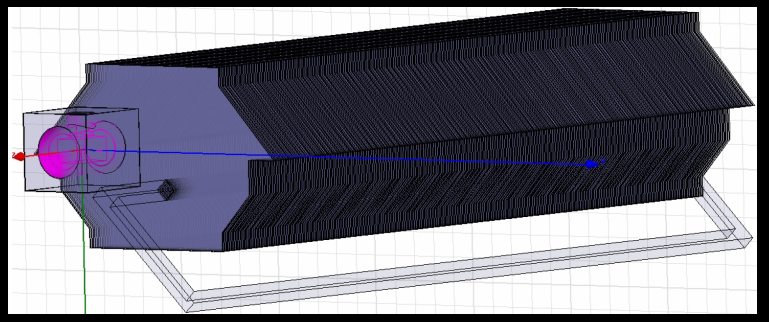
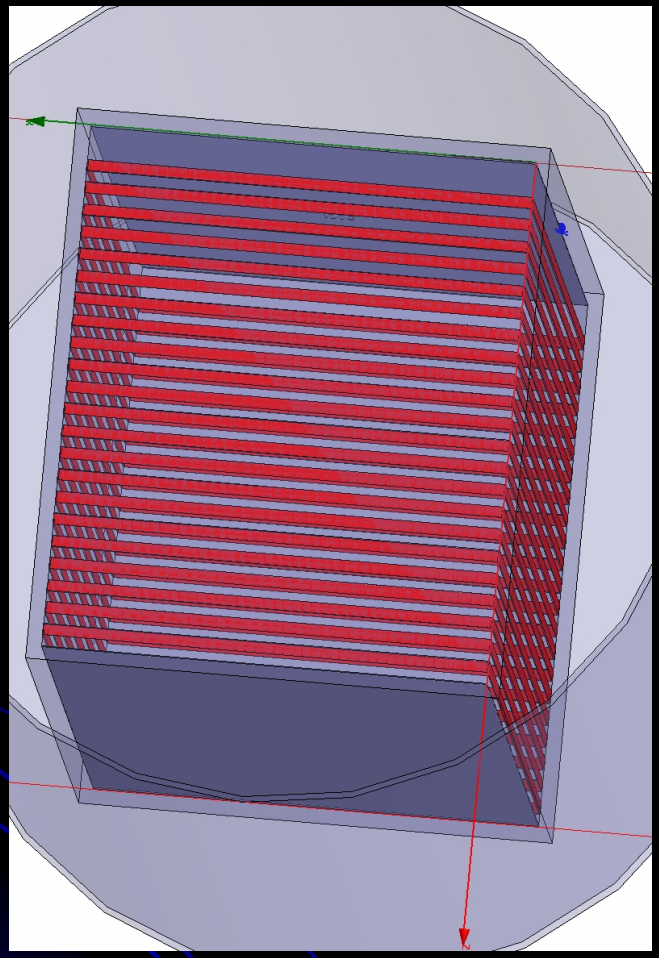
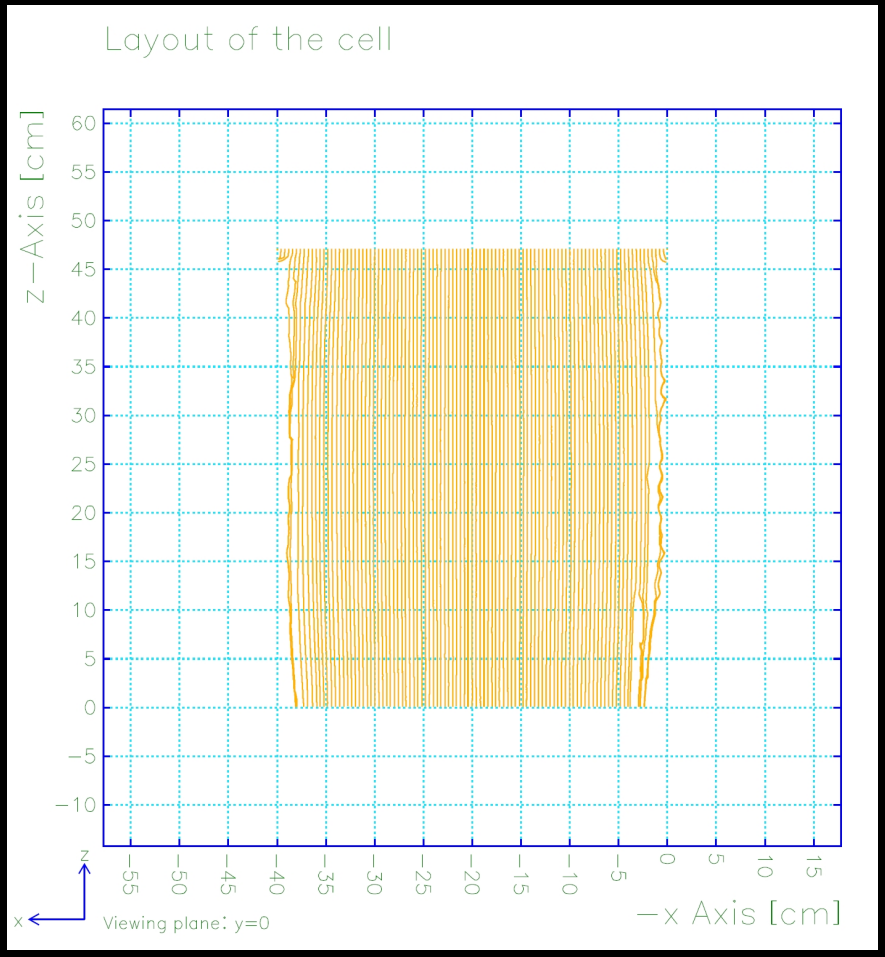


A few notes about ANT_G4 in the CVS

- The GENIE neutrino generator is now available in the CVS with READMEs.
- The ANT_G4 physics list has been significantly updated (hadronic scattering and ionization) and checked.
- I have updated the neutrino generators to use the newest version of the NUMI flux files (gnumi_v19).
  - I need to do some cross checks with the work of Gina and the Italian group on the flux files.

TPC field map





- I need to work with Steve L. to implement the detailed E-field map in the wire signal simulation.

APS Meeting Outline

- Mitch gives his talk right before mine at the meeting. We will give practice talks to the collaboration soon.

- ArgoNeuT Design
  - Cryostat, TPC, and electronics
- Simulation stuff
  - Overview of neutrino generators and Geant setup, wire signals
  - dE/dx for electron/gamma separation.
- Physics reach(?) and goals
  - Demonstrating particle ID with dE/dx
  - Even if we can't obtain publishable results, we can demonstrate the LArTPC's ability to measure:
  - CCQE X-section (QE events->axial mass) using MINOS for muons?
    - The Italians' tech note discusses CCQE events minus MINOS.
  - NCpi0 X-section?
    - Complete event containment is only ~3% (100 events) according to Nuance/Geant. We probably won't have enough events to do an actual physics measurement.
  - CCpi X-sections using MINOS for muons?

What about NC elastic scattering?

- NC elastic ($\nu_\mu \mathrm{p} \rightarrow \nu_\mu \mathrm{p}$ or $\nu_\mu \mathrm{n} \rightarrow \nu_\mu \mathrm{n}$) X-section
  - This could be a great measurement to do in ArgoNeuT (w/o MINOS!). We could demonstrate the power of the LArTPC by using dE/dx and/or topology to get rid of the dominant backgrounds for this channel (NC-1 pion).

$\nu_\mu \mathrm{p} \rightarrow \nu_\mu \mathrm{p} \pi^0$
$\nu_\mu \mathrm{p} \rightarrow \nu_\mu \mathrm{n} \pi^+$
$\nu_\mu \mathrm{n} \rightarrow \nu_\mu \mathrm{n} \pi^0$
$\nu_\mu \mathrm{n} \rightarrow \nu_\mu \mathrm{p} \pi^-$

  - Can we separate proton events from neutron events?
    - Probably not with very high efficiency
  - Ratio of proton NC elastic to CCQE.
  - Possibilities: Strange spin component $\triangle_s$ of nucleon, axial mass.
  - Will we have enough events? Using the expected number of CCQE events from Gina and a CCQE/NC elastic event ratio of ~3.5 (Nuance), we will see ~8000 (neutron and proton) NC elastic events in 180 days of running.
  - I will look at this channel in more detail before APS meeting.